

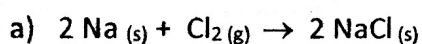
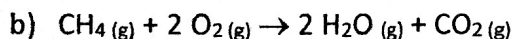
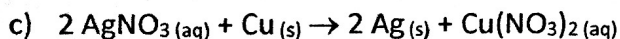
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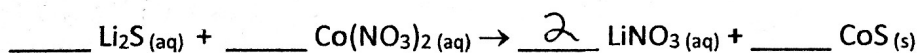
1. (3pts) Determine the number of significant figures in the following:

- a) 35.00 4
 b) 0.0250 3
 c) 6.0180 5

2. (3pts.) Classify the following reactions by type (combination, decomposition, combustion, single displacement or double displacement):

CombinationCombustionSingle Displacement

3. (9pts) Balance the following reaction:

a) What volume of a 0.150M Li_2S solution is required to completely react with 125mL of a 0.200M $\text{Co(NO}_3)_2$ solution?

$$\text{mol Co(NO}_3)_2 = (0.125 \text{ L})(0.200 \text{ M}) = 0.0250 \text{ mol Co(NO}_3)_2$$

$$0.0250 \text{ mol Co(NO}_3)_2 \left(\frac{1 \text{ mol Li}_2\text{S}}{1 \text{ mol Co(NO}_3)_2} \right) = 0.0250 \text{ mol Li}_2\text{S}$$

$$\text{L Li}_2\text{S} = \frac{0.0250 \text{ mol Li}_2\text{S}}{0.150 \text{ M Li}_2\text{S}} = 0.167 \text{ L} = \underline{\underline{167 \text{ mL}}}$$

b) How much CoS, in grams, is produced from the reaction of Li_2S and $\text{Co(NO}_3)_2$?

$$0.0250 \text{ mol Co(NO}_3)_2 \left(\frac{1 \text{ mol CoS}}{1 \text{ mol Co(NO}_3)_2} \right) = 0.0250 \text{ mol CoS}$$

$$0.0250 \text{ mol CoS} \left(\frac{91.00 \text{ g CoS}}{1 \text{ mol CoS}} \right) = \underline{\underline{2.28 \text{ g CoS}}}$$

- 2) (10 pts.) Elemental analysis of cadaverine (102.2 g/mol) shows that it contains: 58.55% C, 13.81% H and 27.40% N by mass. Determine the empirical and molecular formulas of cadaverine.

$$58.55 \text{ g C} \left(\frac{1 \text{ mol C}}{12.01 \text{ g C}} \right) = 4.875 \text{ mol C}$$

$$13.81 \text{ g H} \left(\frac{1 \text{ mol H}}{1.01 \text{ g H}} \right) = 13.673 \text{ mol H}$$

$$27.40 \text{ g N} \left(\frac{1 \text{ mol N}}{14.01 \text{ g N}} \right) = 1.9557 \text{ mol N}$$

$$\text{C}_{\frac{4.875}{1.9557}} \text{H}_{\frac{13.673}{1.9557}} \text{N}_{\frac{1.9557}{1.9557}} \rightarrow (\text{C}_{2.49} \text{H}_{6.99} \text{N}) \times 2$$

$$\underline{\text{C}_5 \text{H}_{14} \text{N}_2} \leftarrow \text{Empirical Formula} \rightarrow \text{MM: } 102.21 \text{ g/mol}$$

$$n = \frac{102.2 \text{ g/mol}}{102.21 \text{ g/mol}} \approx 1$$

$$\text{Molecular Formula: } 1 \times (\text{C}_5 \text{H}_{14} \text{N}_2) = \underline{\underline{\text{C}_5 \text{H}_{14} \text{N}_2}}$$